

Dielectric Barrier Discharge Plasma Actuators for Aerodynamic Control, Phase I

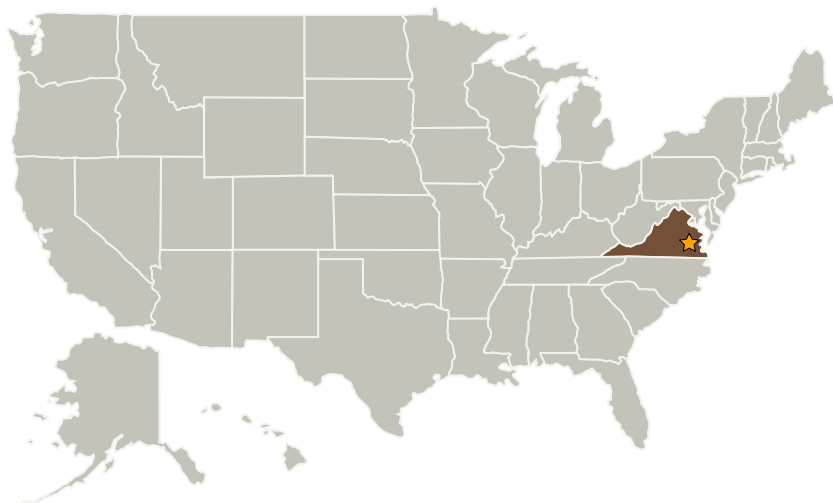
Completed Technology Project (2009 - 2009)



Project Introduction

Flow control is critical to the effective operation of space vehicles where high velocities must be achieved with minimum power consumption. Recent studies at Princeton have demonstrated the utility of dielectric barrier discharge (DBD) plasma actuators for aerodynamic control. Nanosecond pulse sustained DC driven DBDs are predicted to have much higher flow velocities than conventional control systems. Our initial work in the area discovered that these devices produce charge build-up on pulse sustained DC driven DBDs which has hindered the realization of this prediction. If the charge build-up can be minimized, the DC driven DBDs have the potential for higher flow control efficiency than previously attainable with either AC or DC driven DBDs in laboratory experiments. The proposed research will develop integrated surface structures that simultaneously optimize the DBD performance to take advantage of the pulse or RF sustained DC bias approach while suppressing the surface charge build up. This success of this project will be critical for the development of a practical DBD actuator that can be implemented as a control device.

Primary U.S. Work Locations and Key Partners



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Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission
Directorate (STMD)

Lead Center / Facility:

Langley Research Center (LaRC)

Responsible Program:

Small Business Innovation
Research/Small Business Tech
Transfer

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Organizations Performing Work	Role	Type	Location
★ Langley Research Center(LaRC)	Lead Organization	NASA Center	Hampton, Virginia
Cellular Materials International, Inc.	Supporting Organization	Industry	Charlottesville, Virginia

Primary U.S. Work Locations

Virginia

Project Management

Program Director:

Jason L Kessler

Program Manager:

Carlos Torrez

Technology Areas

Primary:

- TX15 Flight Vehicle Systems
 - └ TX15.1 Aerosciences
 - └ TX15.1.5 Propulsion Flowpath and Interactions